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10/826,057	04/16/2004	Shifang Luo	2004B032	9455

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EXAMINER
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BOYER, RANDY

ART UNIT	PAPER NUMBER
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1764

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08/21/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/826,057	<b>Applicant(s)</b> LUO ET AL.	
	<b>Examiner</b> Randy Boyer	<b>Art Unit</b> 1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)<br>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)<br>3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____<br>5) <input type="checkbox"/> Notice of Informal Patent Application<br>6) <input type="checkbox"/> Other: _____ |
|---|--|

## **DETAILED ACTION**

### ***Response to Amendment***

1. Examiner acknowledges response filed 8 June 2007 containing amendments to the claims and remarks.
2. The previous rejection of claims 1, 2, 4-24, 27, and 28 under 35 U.S.C. 102(b) is withdrawn in view of Applicant's amendment to the claims.
3. The previous rejection of claims 25, 26, 29, and 30 under 35 U.S.C. 103(a) is maintained.
4. New grounds for rejection necessitated by Applicant's amendment to the claims are entered with respect to claims 1, 2, and 4-30. The rejections follow.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1, 2, 4-15, and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (US 3183278). Alternatively, claims 1, 2, 4-15, and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (US 3183278) in view of Bottcher (US 2004/0024273).

9. With respect to claim 1, Koch discloses a process for reducing naphthalene concentration in a naphthalene containing aromatic fluid, the process comprising hydrogenating at least a portion of the naphthalene in the presence of a Group VIII

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metal catalyst (column 1, lines 30-50) at a temperature from 50°C to 110°C (column 3, lines 19-21) to form tetrahydronaphthalene (column 2, lines 12-14).

Koch does not disclose wherein the Group VIII metal catalyst is one consisting of palladium.

However, Koch discloses wherein the Group VIII metal catalyst is a ruthenium-containing catalyst that may be promoted by palladium (see Koch, column 1, lines 30-50; and column 3, lines 4-9). Moreover, palladium is an art-recognized substitute catalyst material for ruthenium that may be used in processes for the hydrogenation of aromatic species (e.g. naphthalene) (see e.g., Bottcher, paragraphs 32, 35, and 109).

Therefore, it would have been obvious to the person having ordinary skill in the art of processes for reducing naphthalene concentration in naphthalene containing aromatic fluids to substitute palladium for the ruthenium catalyst of Koch because palladium and ruthenium are art-recognized equivalents that may be used for the same purpose – i.e. hydrogenation of aromatic species. See MPEP § 2144.06.

10. With respect to claim 2, Koch discloses wherein tetrahydronaphthalene is further hydrogenated to decahydronaphthalene (column 2, lines 12-14).

11. With respect to claims 4 and 5, Koch discloses wherein the catalyst is supported (column 3, lines 10-14).

12. With respect to claim 6-8, Koch discloses wherein the metal catalyst comprises palladium at 0.5 wt% on an alumina support (column 3, lines 4-14, and Table A).

13. With respect to claims 9-11, Koch discloses wherein the metal catalyst comprises palladium at 0.5 wt% on a carbon support (column 3, lines 4-14, and Table A).

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14. With respect to claims 12-14, Koch discloses wherein the metal catalyst comprises palladium at 0.5 wt% on a silica support (column 3, lines 4-14, and Table A).

15. With respect to claim 15, Koch discloses wherein the hydrogenation occurs at a temperature from 0°C to 400°C (column 3, lines 19-21).

16. With respect to claim 18, Koch discloses wherein the hydrogenation occurs in a fixed bed reactor (Example IV).

17. With respect to claims 19-23, Koch discloses wherein the aromatic fluid is naphthalene (column 1, lines 62-64, and column 2, lines 3-4).

18. Claims 16, 17, 24, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nowack (US 3912787). Alternatively, claims 16, 17, 24, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nowack (US 3912787) in view of Bottcher (US 2004/0024273).

19. With respect to claims 16 and 17, Nowack discloses a process for reducing naphthalene concentration in a naphthalene containing aromatic fluid (column 3, lines 31-36 and 64), the process comprising hydrogenating at least a portion of the naphthalene in the presence of a Group VIII metal catalyst (column 4, lines 23-25) at a temperature from 50°C to 110°C (column 5, lines 52-54) to form tetrahydronaphthalene (column 7, lines 35-36), wherein the hydrogenation occurs at a pressure from 100 psig to 3500 psig (column 5, lines 56-61).

Nowack does not disclose wherein the Group VIII metal catalyst is one consisting of palladium.

However, Nowack discloses wherein the Group VIII metal catalyst is a ruthenium-containing catalyst (see Nowack, column 4, lines 23-25). Moreover, palladium is an art-recognized substitute catalyst material for ruthenium that may be used in processes for the hydrogenation of aromatic species (e.g. naphthalene) (see e.g., Bottcher, paragraphs 32, 35, and 109).

Therefore, it would have been obvious to the person having ordinary skill in the art of processes for reducing naphthalene concentration in naphthalene containing aromatic fluids to substitute palladium for the ruthenium catalyst of Nowack because palladium and ruthenium are art-recognized equivalents that may be used for the same purpose – i.e. hydrogenation of aromatic species. See MPEP § 2144.06.

20. With respect to claim 24, Nowack discloses wherein naphthalene conversion to tetrahydronaphthalene is greater than 85% (column 8, lines 3-4).

21. With respect to claims 27 and 28, Nowack discloses wherein selectivity to tetrahydronaphthalene is greater than 85% (column 8, lines 1-3).

22. Claims 25, 26, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nowack (US 3912787) in view of Dunkel (US 1965956). Alternatively, claims 25, 26, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nowack (US 3912787) in view of Dunkel (US 1965956) and Bottcher (US 2004/0024273).

23. With respect to claims 25, 26, 29, and 30 Nowack discloses a process for reducing naphthalene concentration in a naphthalene containing aromatic fluid (see Nowack, column 3, lines 31-36 and 64), the process comprising hydrogenating at least

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a portion of the naphthalene in the presence of a Group VIII metal catalyst (see Nowack, column 4, lines 23-25) at a temperature from 50°C to 110°C (see Nowack, column 5, lines 52-54) to form tetrahydronaphthalene (see Nowack, column 7, lines 35-36), wherein naphthalene conversion to tetrahydronaphthalene is 94% (see Nowack, column 7, lines 3-4).

Nowack does not disclose wherein naphthalene conversion to tetrahydronaphthalene is greater than 99% or wherein the selectivity to tetrahydronaphthalene is greater than 98%; or wherein the Group VIII metal is one consisting of palladium.

However, Nowack discloses wherein the Group VIII metal catalyst is a ruthenium-containing catalyst (see Nowack, column 4, lines 23-25). Moreover, palladium is an art-recognized substitute catalyst material for ruthenium that may be used in processes for the hydrogenation of aromatic species (e.g. naphthalene) (see e.g., Bottcher, paragraphs 32, 35, and 109). In addition, Dunkel discloses a process for the hydrogenation of naphthalene to tetrahydronaphthalene and decahydronaphthalene at a pressure of 150 atm and temperature of 300°C in the presence of a nickel-molybdenum catalyst (see Dunkel, Example 3). Dunkel discloses that under these reaction conditions, decahydronaphthalene is obtained along with a minimal amount (3%) of tetrahydronaphthalene (see Dunkel, Example 3). Dunkel further discloses that when the reaction conditions are held constant and the pressure is lowered to between 50-70 atm, then tetrahydronaphthalene is exclusively obtained (see Dunkel, Example 3). Thus, Dunkel discloses that for otherwise equal reaction conditions, a drop is



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pressure will shift the reaction equilibrium toward the complete conversion of naphthalene to tetrahydronaphthalene with no decahydronaphthalene being produced.

Therefore, it would have been obvious to the person having ordinary skill in the art at the time the invention was made to (1) lower the reaction pressure of the Nowack process to such a degree that a naphthalene to tetrahydronaphthalene conversion of greater than 99% were obtained, along with a corresponding selectivity to tetrahydronaphthalene greater than 98%; and (2) substitute palladium for the ruthenium catalyst of Nowack because palladium and ruthenium are art-recognized equivalents that may be used for the same purpose – i.e. hydrogenation of aromatic species. See MPEP § 2144.06.

24. Claims 1, 4, 5, 9, 10, 16, and 24-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rylander (P.N. Rylander and D.R. Steele, *Selectivity in Platinum Metal Catalyzed Hydrogenations*, Engelhard Industries, 113-120).

25. With respect to claim 1, Rylander discloses a process for reducing naphthalene concentration in a naphthalene containing aromatic fluid, the process comprising hydrogenating at least a portion of the naphthalene in the presence of a Group VIII metal catalyst consisting of palladium to form tetrahydronaphthalene (see Rylander, page 116).

Rylander does not disclose wherein the hydrogenation occurs at a temperature from 50°C to 110°C. However, Rylander does disclose wherein the hydrogenation occurs at a temperature from 115°C to 120°C (see Rylander, page 116). Moreover, the court has instructed that differences in temperature will generally not support the

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patentability of subject matter encompassed by the prior art unless there is evidence to indicate that such temperature is critical. See MPEP § 2144.05(II) (citing *In re Aller*, 220 F.2d 454 (CCPA 1955)).

Therefore, Examiner finds Applicant's limitation wherein the hydrogenating occurs "at a temperature from 50°C to 110°C" to be of no patentable consequence in view of the teachings of Rylander.

26. With respect to claims 4, 5, 9, and 10, Rylander discloses wherein the metal catalyst consists of 5% palladium on a carbon support (see Rylander, page 116).

27. With respect to claim 16, Rylander discloses wherein the hydrogenation occurs at a pressure of 1000 psig (see Rylander, page 116).

28. With respect to claims 24-30, Rylander discloses wherein the palladium-catalyzed reduction of naphthalene stopped spontaneously at the tetralin stage, implying a very high conversion to tetrahydronaphthalene (i.e. tetralin) and a correspondingly high selectivity for tetrahydronaphthalene (see Rylander, page 116; and Abstract).

### ***Response to Arguments***

29. Applicant's arguments with respect to all claims have been considered but are moot in view of the new ground(s) of rejection.


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**Conclusion**

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

RPB

  
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Technology Center 1700